
Cestrum sotonunezii, a New Species of Solanaceae from Central Mexico

Juan Carlos Montero-Castro

Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo, Ciudad Universitaria, Edificio B2, 3^{er} piso, Morelia, 58030 Michoacán, México. cestrum2003@yahoo.com.mx

ABSTRACT. The new species *Cestrum sotonunezii* Mont.-Castro (Solanaceae) is described from central Mexico. Because of their overall similarity, specimens of the new species have been previously confused with *C. flavescens* Greenm., *C. aurantiacum* Lindl., *C. oblongifolium* Schltld., and *C. thyrsoideum* Kunth, all of which also occur in central Mexico. The new species is most similar to *C. flavescens*, but is clearly separated by several characteristics, mainly differences in the androecium. The new species is described and illustrated, and a key to distinguish morphologically similar species in central Mexico (Guerrero, Michoacán) is provided.

RESUMEN. Se describe la especie nueva *Cestrum sotonunezii* Mont.-Castro (Solanaceae) proveniente del centro de México. Las colecciones de la nueva especie han sido confundidas con otras especies que se distribuyen en el centro de México como *C. flavescens* Greenm., *C. aurantiacum* Lindl., *C. oblongifolium* Schltld. y *C. thyrsoideum* Kunth. Con la primera especie guarda gran parecido pero *C. sotonunezii* está claramente separada por varias características, especialmente en los estambres. Se incluye ilustración de este taxon y clave para diferenciar especies morfológicamente similares del centro de México (Guerrero, Michoacán).

Key words: Balsas River Basin, *Cestrum*, *Cestrum* sect. *Habrothamnus*, Guerrero, IUCN Red List, Mexico, Michoacán, Solanaceae.

Flowers of *Cestrum* L. (Solanaceae) are readily identified as being tubular and narrow, with relatively short lobes, and frequently grouped into axillary clusters along or at the branch apices. In addition, the basal portion of the androecium is fused to the lower internal corolla wall, where a bulge is developed close to the point of adnation. A more detailed description of these and other contrasting features of *Cestrum* can be found in Benítez de Rojas and D'Arcy (1998). The new species *C. sotonunezii* Mont.-Castro, like other species in *Cestrum* sect. *Habrothamnus* (Endl.) Schltld., has highly attractive, club-shaped flowers, which are visited by hummingbirds (D'Arcy, 1999). This floral shape has been a diagnostic feature to classify species in this section (Francey, 1935).

However, this proposed classification has been questioned by Nee (2001), and work is now in progress in the systematics of *Cestrum* to ascertain the phylogeny of this group of plants (Montero et al., 2006).

Specimens of the new species *Cestrum sotonunezii* have been previously confused with those of *C. aurantiacum* Lindl., *C. oblongifolium* Schltld., and *C. thyrsoideum* Kunth, even though these latter three species clearly differ morphologically from the former. Presumably, these misidentifications occurred because all four species have brilliant yellow, tubular corollas and are distributed mainly in central Mexico. Material of *C. sotonunezii* is more difficult to distinguish from that of *C. flavescens* Greenm. because both species have twigs, buds, and leaves with crumpled hairs, and flowers with comparable shape and color. Nonetheless, plants of *C. sotonunezii* can usually be distinguished by being more robust and by having the filaments emerging immediately below or directly from a bilobed bulge in the corolla, as well as by the length of its corolla lobes. The distinctions between these five species are presented in the following key. This key separates *C. sotonunezii* and allied species in central Mexico that are characterized by having 5- to 25-flowered axillary cymes near the branch tips, with unscented, showy, yellow or orange flowers.

KEY TO *CESTRUM SOTONUNEZII* AND ALLIED SPECIES IN CENTRAL MEXICO

- 1a. Calyx tube > 7 mm long *C. thyrsoideum*
- 1b. Calyx tube < 6.5 mm long.
 - 2a. Plants flowering only when mature leaves are present; leaves glabrous.
 - 3a. Calyx lobes mucronate *C. aurantiacum*
 - 3b. Calyx lobes deltate *C. oblongifolium*
 - 2b. Plants flowering when development of leaves begins or with mature leaves; leaves pubescent.
 - 4a. Stamen filament bases adnate to the lower internal corolla wall, free portion emerging ca. 2 mm above an entire bulge; corolla lobes \leq 1 mm *C. flavescens*
 - 4b. Stamen filament bases adnate to the lower internal corolla wall, free portion emerging below or directly from a bilobed bulge; corolla lobes 1.3–2.8 mm *C. sotonunezii*

Cestrum sotonunezii Mont.-Castro, sp. nov. TYPE: Mexico. Guerrero: Mpio. Chichihualco [Mpio. Leonardo Bravo], Filo de Caballo, 2190 m, 22 May 1986, J. C. Soto Núñez 12678 (holotype, MEXU; isotypes, MO, NY, US). Figure 1.

Haec species inter congeneros centralimexicanos quoad folia pubescentia, florescentiam praecocem coetaneumve etiam tubum calycinum minus quam 6.5 mm longum *Cestro flavescenti* Greenm. simillima, sed ab eo ramis robustioribus, foliis majoribus, lobis corollinis 1.3–2.8 mm longis atque staminibus ad corollae parietem internum infra protuberationem bilobam insertis vel ex ea ipsa ortis distinguitur.

Shrubs 1–3 m high, flowering from the end of dry season when leafless or as the new leaves develop, few-branched from the base, glabrous, sparsely covered with lenticels; twigs and buds pubescent with crisped hairs. Leaves simple, alternate, membranous, puberulent adaxially, tomentose abaxially, ovate to widely ovate (young leaves elliptic), $3.7\text{--}10 \times 2\text{--}5.8$ cm, cuneate at base, acuminate at apex, lateral veins 7 to 9, opposite to subopposite, arcuate-ascending; petiole canaliculate, 11–30 mm. Inflorescences in axillary cymes on young branches, several-flowered, each cyme comprising 3 to 4 sessile flowers, peduncle 4–8 mm, often several cymes grouped near branch tip forming a corymbiform structure. Flowers diurnal, unscented, 14–22 mm, subtended by a bract, trullate-lanceolate, pilosulose, $1.2\text{--}7 \times 0.5\text{--}3$ mm; calyx obconic, $4.5\text{--}6.5 \times 2.2\text{--}2.7$ mm, pilosulose, teeth deltoid, 0.5–1 mm, the tips ciliolate and faintly reflexed; corolla clavate, bright yellow-orange, tube 13–21 mm, glabrous, expanding gradually upward, contracted near the limb, mouth 2.9–3.5 mm wide, lobes deltoid, $1.3\text{--}2.4 \times 1.8\text{--}2.9$ mm, external margins ciliolate; stamens 10.5–19 mm, filament bases adnate to the corolla inner wall, free portion of filaments emerging below or directly from a bilobed bulge, up to 6–10 mm, glabrous; anthers oblong, 1.1–1.25 mm; gynoecium with nectary disk; ovary globose, 1–1.3 mm across, glabrous, 9 to 12 ovules; style 11–19 mm, distally granulose; stigma capitate, minutely papillate. Fruits ovoid, white, $6.5\text{--}9 \times 5\text{--}7.5$ mm; fruiting calyx accrescent, 7–9 mm, sometimes splitting at the sinuses; seeds prismatic in shape, $3.5\text{--}5 \times 2.1\text{--}3$ mm.

Distribution, habitat, and IUCN Red List category. The new species has been collected only in small areas at altitudes from 1800 to 2800 m on calcareous soils, in ecotone communities of oak woodlands and tropical dry forests in two regions of central Mexico, from localities near Mil Cumbres, Michoacán, along the Trans-Mexican Volcanic Belt, and from localities near Filo de Caballo, Guerrero,

along the Sierra Madre del Sur. These areas of occupancy are separated by 260 km (air), but are principally isolated by the barrier of the Balsas River Basin. Although the areas of occupancy are very distant, they are smaller than 10 km², and moreover the population size is fewer than 250 mature individuals. Thus, according to IUCN Red List criteria (IUCN, 2001), this species is evaluated here as Endangered (EN). Because this species is distributed in an ecotone, it is difficult to specify the different climatic variables. The climate within the different localities was established with the help of climatic maps (Vidal-Zepeda, 1990; García & CONABIO, 1998). *Cestrum sotonunezii* is distributed in an intermediate climate, ranging from temperate subhumid to semiwarm subhumid, group C types, with an annual mean temperature between 12°C and less than 18°C, and an annual mean precipitation of 800 to 1200 mm. The microclimatic conditions of the localities will be evaluated in further detailed studies.

Etymology. The specific epithet honors José C. Soto Núñez, an important collector in the region where this species is distributed, who has contributed to the knowledge of the diversity of the flora of Mexico.

Discussion. *Cestrum sotonunezii* is clearly distinguishable from *C. thyrsoides*, since the former has a tight calyx at the base of the corolla, and the calyx length is less than one third of the corolla length. In contrast, the calyx of *C. thyrsoides* is loosely placed on the corolla base, and its length exceeds one third of the corolla length. *Cestrum oblongifolium* and *C. aurantiacum* can both be distinguished from the new species by their glabrous leaves. More complex is the differentiation of *C. sotonunezii* from *C. flavescens*, as both species are superficially similar in both vegetation and flowers. Furthermore, both species flower from February to May when the plants are completely or nearly leafless. However, specimens of *C. sotonunezii* have more robust branches than *C. flavescens*, and while the leaves of the two species have comparable pubescence, those of *C. flavescens* are consistently smaller. In addition, flowers of both are similar in size, often slightly bigger in *C. flavescens* (although a populational study is needed to confirm this). The features that definitely separate these two species are the stamen and the degree of fusion between the internal corolla and the filaments. In *C. flavescens*, the stamens extend to ca. 2 mm below the stigma, and their bases are fused to the corolla ca. 2 mm above the bulge of the filaments (Fig. 2). Conversely, in *C. sotonunezii* the stamens reach to 1 mm below the stigma, and their bases are fused to the corolla below or at the same height as the corolla bulges.

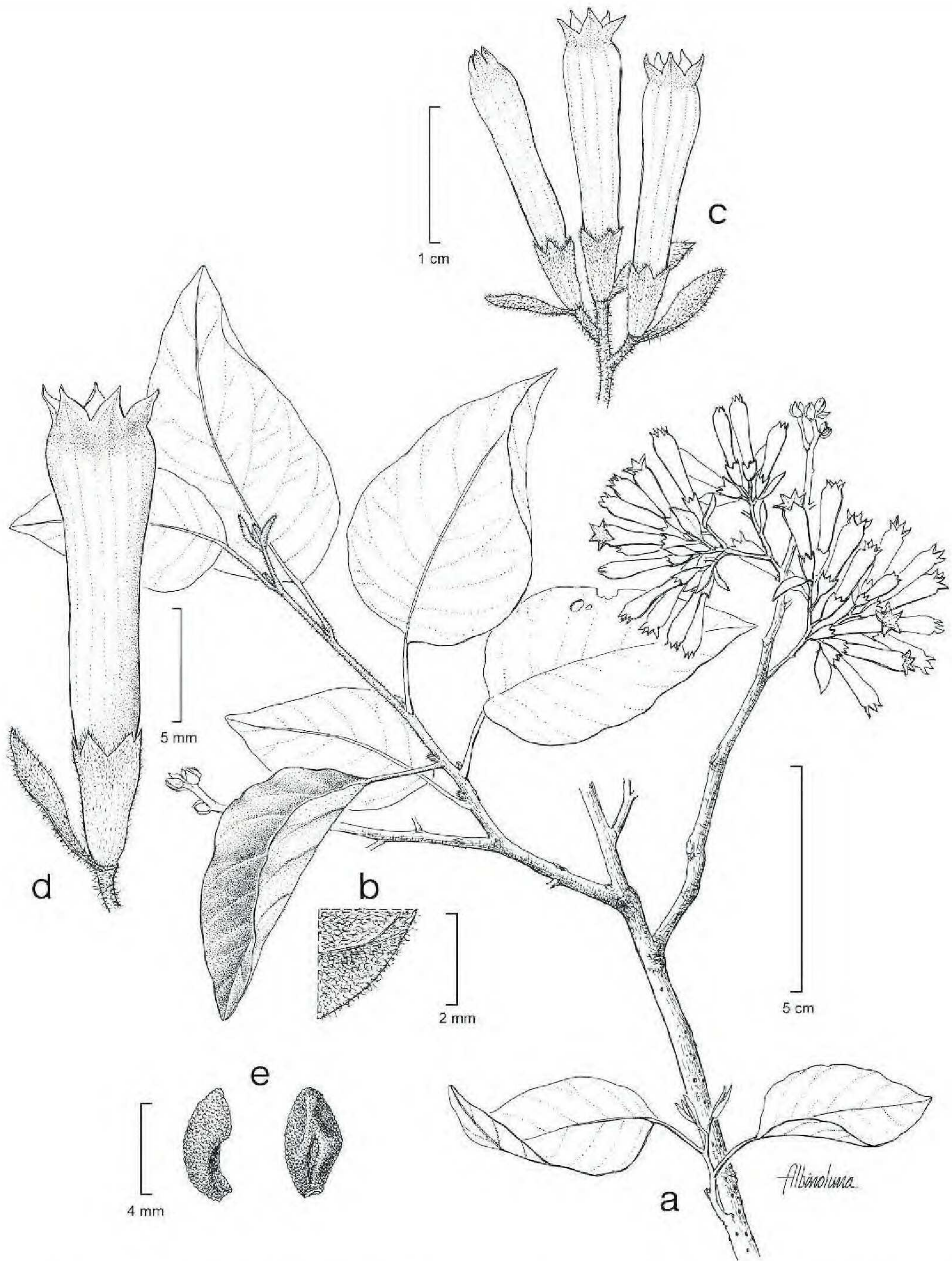


Figure 1. *Cestrum sotonunezii* Mont.-Castro. —A. Fertile branch. —B. Crumpled hairs on leaves. —C. Detail of inflorescence. —D. Individual flower. —E. Seed. A–E from the type *J. C. Soto Núñez 12678* (MEXU). Illustration by Albino Luna.

Paratypes. MEXICO. **Guerrero:** Mpio. Chichihualco [Mpio. Leonardo Bravo], 5 km al SW de Chichihualco, camino a Filo de Caballo, 18 Feb. 1982, *E. Martínez 44* (MEXU); ca. de Filo de Caballo, 19 Apr. 1985, *J. C. Soto 8264* (MEXU); Mpio. General Heliodoro Castillo, Canoas, 1

km al S de Cruz de Ocote, 23 May 1986, *J. C. Soto 12725* (MEXU); 1 km al S de Cruz de Ocote, 17°29'N, 100°07'W, 22 May 1987, *J. S. Miller 2861* (MEXU, MO); Mpio. Leonardo Bravo, Camino Filo de Caballo a Chichihualco, 14 km a partir del Hospital de Filo de Caballo, 17°35'18"N,

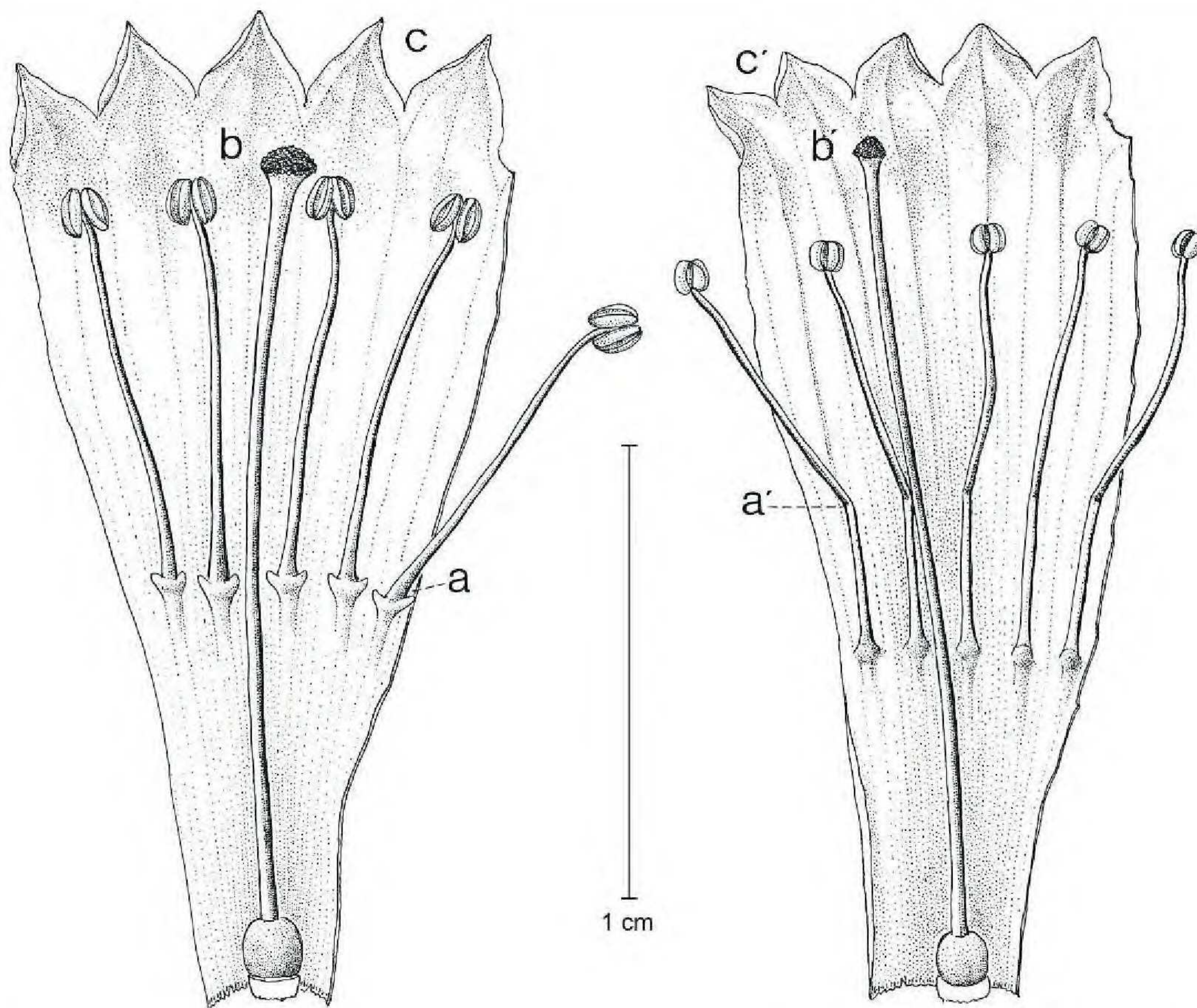


Figure 2. Comparison of characteristics that differentiate *Cestrum sotonunezii* Mont.-Castro (to the left, from the type *Soto Núñez 12678*, MEXU) from *C. flavescens* Greenm. (to the right, from *Pringle 6832*, MEXU). —A, A'. Stamen bases fused to corolla and position of filament bulge. —B, B'. Proportion between stamens and stigma. —C, C'. Size of corolla lobes. Illustration by Albino Luna.

99°47'53"W, 2 Mar. 2002, *J. C. Montero 213* (MEXU, MO, NY, US); Yextla, 7.4 km al SE, 17°32'37"N, 99°54'45"W, 7 July 1998, *B. González 1779* (FCME); 7 km del camino de Chichihualco a Filo de Caballo a partir de la gasolinera de Chichihualco, 10 May 2002, *J. C. Montero 223* (MEXU, NY); de Filo de Caballo a El Jilguero, desviación a Yextla, *J. Calónico 3516* (FCME). **Michoacán:** Mpio. Charo, Las Trojes, 19°39'10"N, 100°56'9"W, 21 Apr. 1986, *S. Zamudio 3874* (MEXU); Mpio. Hidalgo, 5 km antes del Caracol, 23 Apr. 1984, *J. C. Soto 6367* (MEXU); Mpio. Tzitzio, 2 km al S de El Mirador, Mil Cumbres camino a San Antonio Villalongín, 30 Mar. 1982, *E. Martínez-S 442* (MEXU).

Acknowledgments. I thank Mario Sousa Sánchez and María del Rosario García Peña for their assistance in obtaining the studied specimens, as well as the curators of the herbaria at F, FCME, MEXU, MO, and US for facilitating access to their collections; Fernando Chiang and Roy Gereau (MO)

for the Latin diagnosis; Albino Luna for the illustration; Alfonso Delgado Salinas for the critical revision of this paper; and Beth Parada and Allison Brock for their editorial help. Financial support was provided by the Dirección General de Estudios de Posgrado, Universidad Nacional Autónoma de México, and by the Consejo Nacional de Ciencia y Tecnología (No. 158345).

Literature Cited

- Benítez de Rojas, C. E. & W. G. D'Arcy. 1998. The genera *Cestrum* and *Sessea* (Solanaceae: Cestreae) in Venezuela. *Ann. Missouri Bot. Gard.* 85: 273–351.
D'Arcy, W. G. 1999. Red-flowered *Cestrum* and red-loving hummingbirds. Pp. 33–43 in M. Nee, D. E. Symon, R. N. Lester & J. P. Jessop (editors), *Solanaceae IV: Advances in Biology and Utilization*. Royal Botanic Gardens, Kew, Richmond.
Francey, P. 1935. Monographie du Genre *Cestrum* L. *Candollea* 6: 46–398.

-
- García, E. & Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). 1998. Climas (Clasificación de Köppen, modificado por García). Escala 1:1,000,000. CONABIO, México, D.F.
- IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.
- Montero-Castro, J. C., A. Delgado-Salinas, L. Eguiarte-Frutos & E. De Luna. 2006. Phylogenetic analysis of *Cestrum* section *Habrothamnus* (Solanaceae) based on plastid and nuclear DNA sequences. *Syst. Bot.* 31(4): 843–850.
- Nee, M. 2001. An overview of *Cestrum*. Pp. 109–136 in R. G. van den Berg, G. W. M. Barendse, G. M. van der Weerden & C. Mariani (editors), *Solanaceae V: Advances in Taxonomy and Utilization*. Nijmegen University Press, Nijmegen, The Netherlands.
- Vidal-Zepeda, R. 1990. Precipitación media anual en “Precipitación”, IV.4.6. Atlas Nacional de México, Vol II. Escala 1:4,00,000. Instituto de Geografía, UNAM, México, D.F.